

Susquehanna Sports Center | Harford Community College | Bel Air, MD



TECHNICAL ASSIGNMENT I

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Executive Summary

Technical Assignment I provided such a great opportunity to investigate more about the Susquehanna Sports Center Renovation and Expansion, Harford Community College in Bel Air, MD. This package provides a project analysis from a construction management prospective. It will walk you through the schedule, cost, and site logistics along with the main factors that influenced the design process such as: the owner's mission and master plan, and local site conditions.

This project includes a renovation of the 49,159 square foot Susquehanna Center and a 58,640 square foot basketball arena and fitness center addition, which adds up to 106,955 square feet. Having a project that includes both a renovation and an addition requires such a great collaboration and coordination between all parties involved in this project.

This project started construction at May 23rd, 2011 and was originally planned to finish at September 17th, 2012. However, due to weather related impacts, Turner has been granted a 28 working day extension for the Arena Addition. The Renovation portion of the project has not been affected and already finished up at September 17th. The total cost of the project is \$26.7M after about \$1.65M worth of value engineering savings.

The new addition has 153' steel trusses that span through the new basketball arena addition. It has a beautifully designed curtain wall at the top portion of the walls, which increases the usage of natural light. The owner, Harford Community College, had a goal to make the campus more environmentally friendly and this is one the projects that they had in their master plan. They were originally planning on getting Silver LEED certification for this project. However, the owner decided not to strive for it right before construction started, but still the environment is one of the main components to care about in this project.

All in all, this report should be able to familiarize you (as it did to me) with the project overall from a construction management stand point as it touches on the most of the key CM points. That means it is a great starting point to move on with the thesis research and continue on with a more extensive cost and schedule analysis and then into alternative methods analysis.

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Project Schedule Summary*

This project was originally planned to start on 05/23/2011 and finish on 09/17/2012, but a change occurred due to weather impacts which affected the addition portion of the project. It is now scheduled to finish on November 7th, 2012. Below are explanations of the project schedule's key tasks.

Foundation:

In order to construct the new arena, it requires underpinning where the addition meets the existing building. The arena will be supported by concrete spread footings with concrete foundation walls. Underpinning has been grouped with the bulk excavation task in Appendix A – Project Schedule.

Structure:

The structure includes load-bearing concrete columns supporting long span steel joists, structural steel framing, and metal deck at the arena roof. Structural steel trusses are used to support the atrium roof. The rooftop mechanical equipment is located on a low roof between the Arena and the existing building.

Enclosure:

Roofing for the new arena is a TPO membrane system. The existing built-up roof will be patched where affected by the renovations. The typical exterior finish is brick veneer with masonry backup walls. Wide roof eaves and column covers will be clad with composite metal panels. The addition has aluminum and glass entrances, storefront and clerestories. The existing storefront and windows will be replaced.

Finishes sequences:

Finishes in the existing facility include terrazzo patching in the corridors, sports flooring in the fitness center, carpet, resilient and tile flooring. For the new arena, finishes include the wood athletic floor, concrete concourse and lobby flooring, tile at the toilet rooms, suspended metal acoustic ceilings and an exposed, painted roof structure. All that was selected to best accommodate the occupants' needs and give it an aesthetic pleasing look to it. Athletic equipment will include fixed and portable basketball backstops, scoreboards and shot clocks.

**Please refer to Appendix A for the Project Schedule.*

Building Systems Summary

Work Scope	Yes or No
Demolition	Yes
Structural Steel Frame	Yes
Cast in Place Concrete	Yes
Precast Concrete	No
Mechanical System	Yes
Electrical System	Yes
Masonry	Yes
Curtain Wall	Yes
Support of Excavation	Yes

TABLE 1: BUILDING SYSTEMS SUMMARY FORM

Demolition

For the western building addition, all vegetation, topsoil, existing fill and otherwise unsuitable materials within the building pad area extending to about 5 feet beyond the exterior wall lines were removed to expose undisturbed native soils. All existing utility trench backfill was removed. After performing the necessary underpinning*, the building pad area was cut to grade.

**More about underpinning in the "Support of Excavation" section*

Building Systems Summary: cont'd

Structural Steel Frame

What is interesting about the usage of the structural steel in this project is that they used (23) 153' 96SLHSP trusses spaced 8' apart that span through the new basketball arena addition (Figure 1). W6x25 are also used at the south and north sides of the arena to hold the cantilevered roof. W10x12, W16x31, and W12x14 are used at the Susquehanna Center addition along with HSS6x3x5/16 used in the façade of the center. Cast in Place concrete has been used in the main lobby area connecting the new basketball arena with the Susquehanna center. All structural steel are obtained from a domestic origin and meet all requirements of "Maryland Buy American Steel Act."

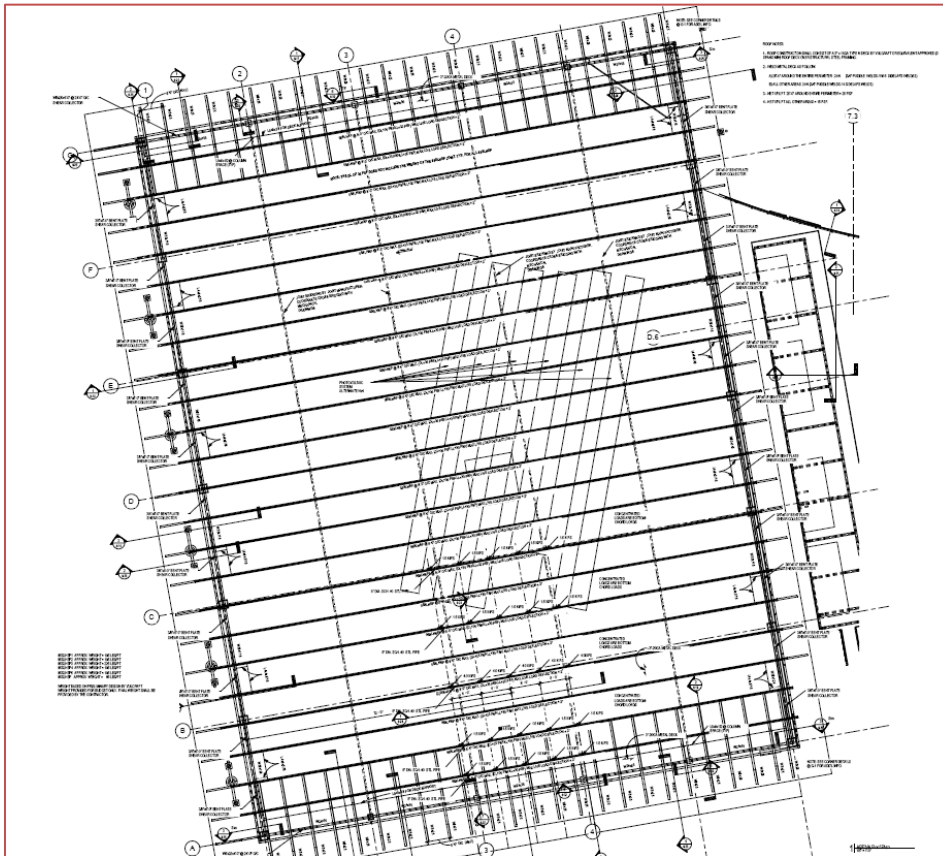


FIGURE 1. STRUCTURAL DRAWING OF THE ARENA ADDITION*

**Please refer to Appendix B for a better resolution drawing of the basketball addition*

Building Systems Summary: cont'd

Cast in Place concrete

Cast in place concrete is used in all concrete construction in this project. No precast concrete has been used. Common or Utility grade formwork used for non-exposed surfaces. Structural or Construction grades are used for wales, braces, and supports. All lumber used for formwork are either Western Wood Products or Southern Forest Products grading. Plywood is APA PS-I, B-B, or Exterior Grade MDO. Glass fiber reinforced forms are used for cylindrical columns, pedestals, and supports with smooth surfaces that will produce surfaces without seams or irregularities which exceed specified formwork surface class. As for concrete placement methods, a concrete pump truck is used to pump concrete.

Mechanical System

All existing HVAC systems will be demolished and removed except for HVAC hot water boilers. New HVAC hot water pumps and hot water distribution along with a new 340 ton air-cooled chiller are included. The existing building is served by 4 rooftop air-handling units with chilled water and hot water coils along with a dedicated DX rooftop unit for the pool area. The new addition is served by (4) rooftop DX air-handling units with hot water preheat coils and heat recovery wheels.

Electrical System

The power distribution system is serviced from the North-West portion of the existing building on the main level. Baltimore Gas and Electric supplied a 2000kVA transformer that the building is fed by. The secondary service will provide the buildings with 277/480 voltage power. Local dry transformers will be used to provide 120/208 voltage power for receptacles and low voltage loads. The service entrance point is on the North-West portion of the building on the main level. A diesel generator will provide emergency power to support the fire alarm system as well as life safety lighting.

Building Systems Summary: cont'd

Masonry

The typical exterior finish is brick veneer with masonry backup walls. Veneer wall ties are used to hold up it up with the brick (Figure 2).

The materials included in the masonry are: water, Portland cement, hydrated lime, aggregate for mortar, water repellent admixtures, accelerators and retarders, and color additives.

Aggregate are stockpiled from same quarry to insure consistency in color. Masonry, mortar, and blended cements are not permitted in this project.

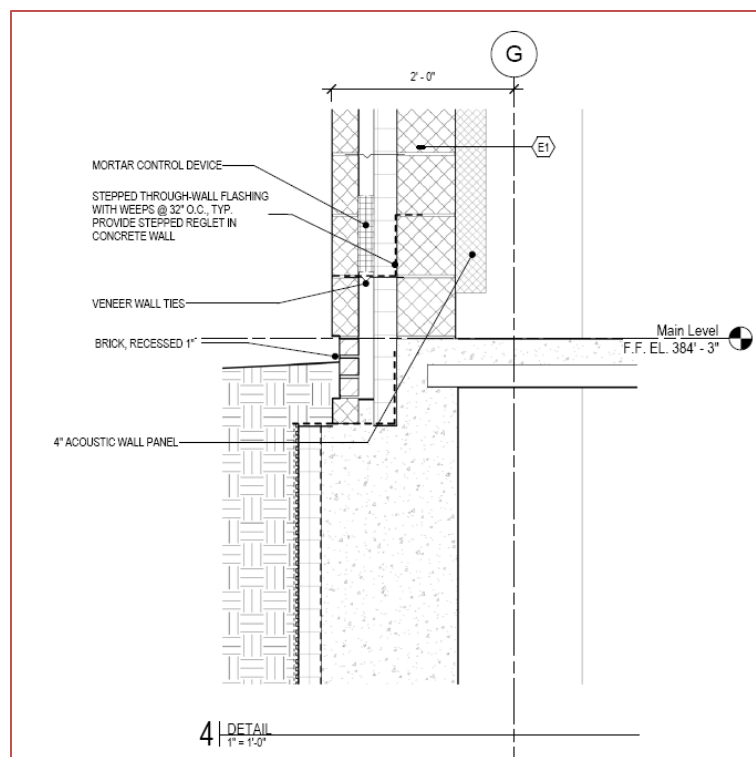


FIGURE 2. BRICK VENEER CONNECTION DETAIL

Building Systems Summary: cont'd

Curtain Wall

Hord, Coplan, & Macht were the main architects for this project, therefore they designed the curtain wall. The Curtain wall is located above the arena masonry wall. A mix of blue, green, and clear insulated glass has been used along with 7" x 2 ½" aluminum curtain wall frames which creates this aesthetically pleasing look to the arena. It drops down to the entrance of the arena. The glass there is tempered to allow for doors to be installed.



FIGURE 3. RENDERING FOR THE SUSQUEHANNA CENTER PROJECT

Support of Excavation

The existing south wall loads of the Susquehanna Center will have to be carried below the founding elevation of the new arena addition which will be as much as 9 to 10 feet deep below the existing footing. Since the proposed building addition wall will directly correspond to the existing wall, it will not be possible to construct a permanent soldier pile or lagging wall to support the existing construction and founding soils as could be possible if the new addition wall was slightly offset from the original. Given the configuration, it has been decided to underpin footings in a series of pits to extend sufficiently below the proposed building addition excavation.

Project Cost Evaluation

The total cost for the project is estimated to be \$26.7M. The cost estimate was prepared by Turner. This section will evaluate the total project cost and compare it to actual costs and R.S.Means estimate.

Actual Building Costs

	Cost	Cost / SF
Construction Cost (CC)	\$24,572,180	\$229.74
Total Cost (TC)	\$26,700,000	\$249.64

TABLE 2. ACTUAL BUILDING COST DATA

Building Systems Costs

System	Total Cost	Cost / SF
Concrete	\$1,895,530	\$17.72
Masonry	\$1,596,620	\$14.93
Structural Steel	\$1,048,791	\$9.81
Plumbing and HVAC	\$4,740,908	\$44.33
Electrical and Fire Alarm	\$1,723,183	\$16.11
Glass systems	\$1,145,650	\$10.71

TABLE 3. MAJOR BUILDING SYSTEMS COSTS

Square Foot Estimate*

A square foot estimate has been prepared for this project using R.S.Means data. The cost came to be significantly lower than the actual cost because R.S.Means did not count for the long-span basketball arena trusses. It has been assumed that the arena is among the gymnasium building category.

Arena Addition Cost: \$8,199,500

Susquehanna Center Renovation Cost: \$8,273,000

**Please refer to Appendix C for a detailed breakdown for the Square Foot Estimate.*

Project Cost Evaluation: cont'd

Assemblies Cost Estimate

A mechanical system cost estimate has been prepared which came out to a total of \$1,369,401.35 which is also less than the actual cost. The actual cost for mechanical and plumbing systems together is well above \$4M. The reason behind that is the assemblies estimate was done for the addition only, so it is extra for the renovation part. Renovation part came out to be much more expensive because they demolished the old system and renewed it with another brand new mechanical system. Not to mention that the \$4M assemblies cost does not have the value engineering value subtracted.

**Please refer to Appendix D for Mechanical assemblies cost*

Existing Conditions

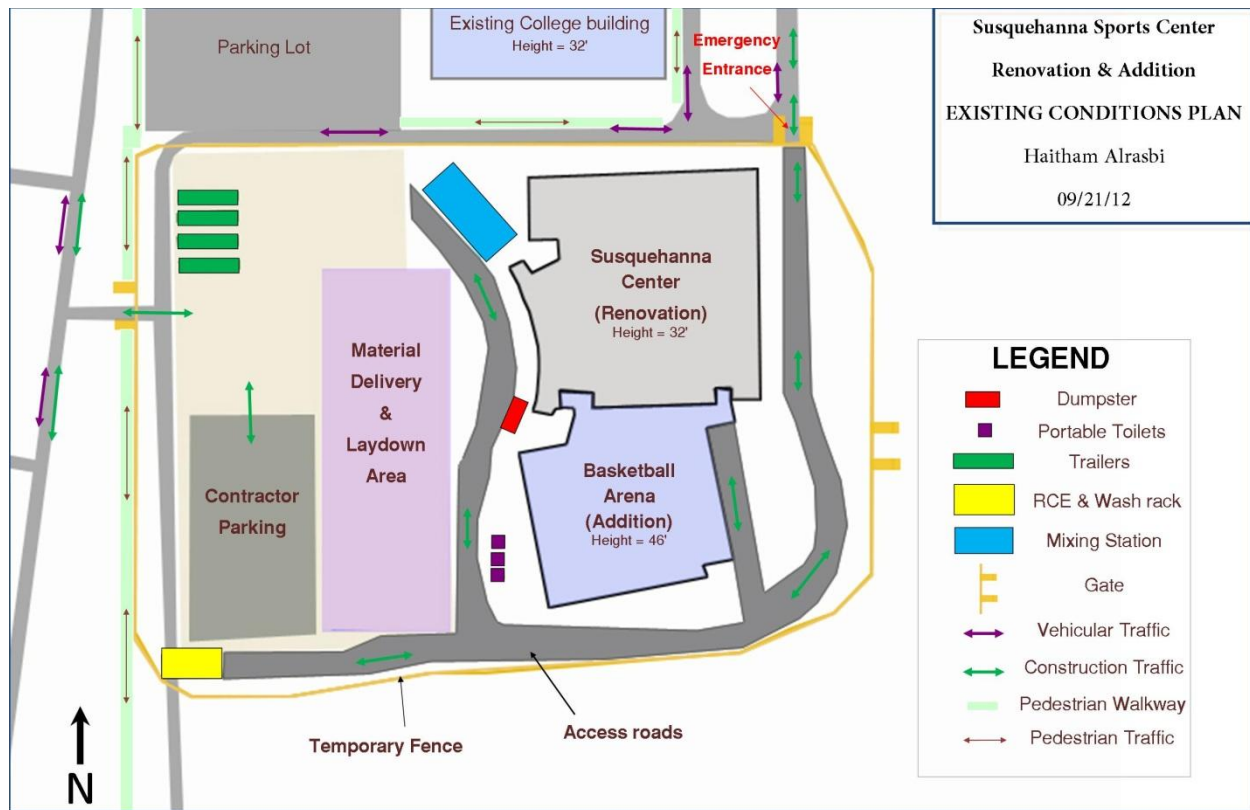


FIGURE 4. EXISTING CONDITIONS SITE PLAN

Figure 4 shows an existing conditions site plan of the Susquehanna Sports Center. Susquehanna Center Renovation part is at the north of the Basketball Arena Addition. The site could be entered from both the west side and from the north-east. The west side is mainly used by contractors and employees who work at the trailer offices. The north-east entrance is mainly used by material delivery trucks, construction workers...etc. The site plan shows how construction, vehicular, and pedestrian traffic flows. All of this was taken under account to construct the best and the safest site logistic plan for students, construction workers, and everybody else.

**Please refer to Appendix E for a better resolution Existing Conditions Site Plan and for the Site Logistics plan provided by Turner.*

Site Layout

For the site layout plans, site plans are phased into three phases: Excavation, Superstructure, and Finishes. Each phase is explained and walked through in the sections related to each one below:

Excavation phase*

Before the excavation began, workers started mobilization into the site and setting up the fence, trailers, mixing stations, dumpsters, toilets, equipment, and everything that will help them get the excavation phase started. The Susquehanna Center has been closed completely for renovations, which means students are not permitted to access it until construction finishes. The north-east entrance is determined as the emergency entrance.

**Please refer to Appendix F for Excavation phase site layout*

Superstructure phase**

The superstructure phase consisted of constructing the building using cast in place and structural steel frames. As discussed before, the basketball arena is designed to have 153' trusses which hold the cantilevered roof. Taking into account the shape and perimeter of the site, and both time and cost efficiency, 150' Krupp mobile is chosen.

***Please refer to Appendix F for Superstructure phase site layout*

Finishes phase***

In the finishing phase, a lot of material is transported into the building, so most of the time both material hoists are being used. The pool inside of the Susquehanna center is being restored so materials are needed to transport into there too.

****Please refer to Appendix F for Finishes phase site layout*

Local conditions

Site description

The Harford Community College campus is located in the Churchville area of central Harford County. The Susquehanna Center athletic building is located on the east side of the campus east of Thomas Run Road.

The ground surfaces south and west of the existing building are irregular and indicate extensive grading. To the east of the proposed addition, the ground surface forms a swale running into the wooded area east of the property. The large open grassed area to the east of the existing Susquehanna Center is likely closer to original grade. In the outside paved and athletic field areas, the ground is generally grass covered with intermittent landscaped clusters of trees.

Subsurface material*

Topsoil was found at the surface of all borings except P-1 and P-4 in pavement areas. The pavement encountered in the both borings was composed of 6 inches of hot-mix asphalt over a 6-inch crushed stone base.

Existing fill was found in borings B-1, B-3, B-4, B-5, and B-7 within the proposed building area. These fills, particularly in boring B-7, are likely the result of filling the former swale or intermittent stream as shown on the previously referenced USDA Soil Survey running west to east through the center of the proposed building addition. The fill generally consisted of loose sandy silt or silty sand or medium stiff, low plasticity sandy silt & clay.

Existing fill was also found sporadically in the site borings. SWM-5 encountered 6 feet of loose sandy silt which, given its position, likely represents filling of the original swale. Fill was also found in SWM-1 to a depth of 6 feet; in pavement boring P-5 to at least 5 feet; and SWM-4 to a depth of 3 feet. The possible fill designation in B-7 indicates that a definite conclusion could not be made as to whether the soil stratum was fill or original ground.

Groundwater conditions*

Groundwater was encountered within all the borings drilled within the proposed south building addition area, as well as in two of the three SWM borings south of the proposed building addition. Groundwater was encountered one day following completion of drilling operations in borings B-1 through B-7, SWM-3 and SWM-5 above borehole cave-in depth.

**Please refer to Appendix G for Boring and Test Pit Location Plan*

Local conditions: cont'd

Groundwater levels ranged from as deep as 23.3 feet in B-3 to as shallow as 7.5 feet in boring SWM-5; however, when comparing groundwater elevations, it was found that groundwater levels were very uniform within most of the building area ranging in elevation from 364 to 366.5 in borings B-1 through B-6 and elevation 370 in B-7. In SWM-3 and SWM-5, groundwater levels range in approximate elevation from 362 to 365.

Recycling and tipping fees

This project was at some point in the design phase striving for Silver LEED certification, but then the owner decided not to do it before the project started. However, Recycling service is maintained in this project. There is a dumpster service on site which collects combined trash and then sorts it. Percentages of how much recycling has to be done are provided to the construction team, and that has been set as goal for the team.

Parking

The Susquehanna Center did not have sufficient parking, so it was within the scope of work to add parking spaces which could be used for the Susquehanna Center, the added basketball arena, the soccer fields, and the surrounding Harford Community college buildings. There were about 200 parking spaces for the Susquehanna center. The tennis courts were removed from the front the Susquehanna Center and replaced by an additional 400 parking spaces. The tennis courts will be moved to the back (East) of the Susquehanna Center. Since the parking spaces are taking a large space in the construction site, some of it was used for trailer space and storage before the parking was constructed. After it was constructed, it was used sometimes for storage space. The construction team and workers used the existing parking spaces throughout the timeline of the project.

Permitting

The construction team did not face any problems prior to construction regarding local conditions and permits. Submittals and approvals were all done well before the construction start date to allow for material lead time, engineering/shop drawing period, and other typical preconstruction activities. All that leads to having everything in the preconstruction period go smooth and as planned. Construction started May 23rd, 2011 as initially planned.

Client Information

Harford Community College (HCC) is the owner of this project. It is located in Bel Air, Harford County, Maryland. It was founded in 1957. Their mission is to provide high quality educational experience for the community through a dynamic, open-access institution along with promoting lifelong learning, workforce development, and social and cultural enrichment. Their most fundamental values are Lifelong Learning, Integrity, Excellence, Diversity, Communication and Collaboration, and Service.

The Susquehanna Sports Center Expansion and Renovation is a part of Master Plan adopted by the Board of Trustees for fall 2008 – fall 2012. There was a former plan developed in the late 1980s, but it became outdated as the current president states so they needed a new plan. There are many reasons for this plan. It creates more green area that helps protect the environment and makes the college more livable. It reconfigures walkways and roads, and creates more parking spaces.

HCC is not only open for students, staff, faculty; it also has many events open for the community of Harford County. It is considered as the educational, cultural, and recreational center of the county. A cultural events program and a community theater produce a full series of offerings each year. Thomas Run Park on the College campus offers a lighted artificial turf field for lacrosse and soccer, and several baseball and softball fields serving adult athletic needs for tournaments, evening activities and special events. Other indoor and outdoor athletic and recreation facilities open to the community include the gym, fitness center, pool, tennis courts, basketball, and sand volleyball.

All in all, This Facilities Master Plan will guide the expansion and renovation of HCC's facilities to meet programmatic needs, restore satisfactory physical condition, meet regulatory requirements, implement the College's Strategic Plan, and maintain alignment with a campus-wide sustainability initiative that encourages environmentally responsible plans, services, operations, and curricula.

Project Delivery System

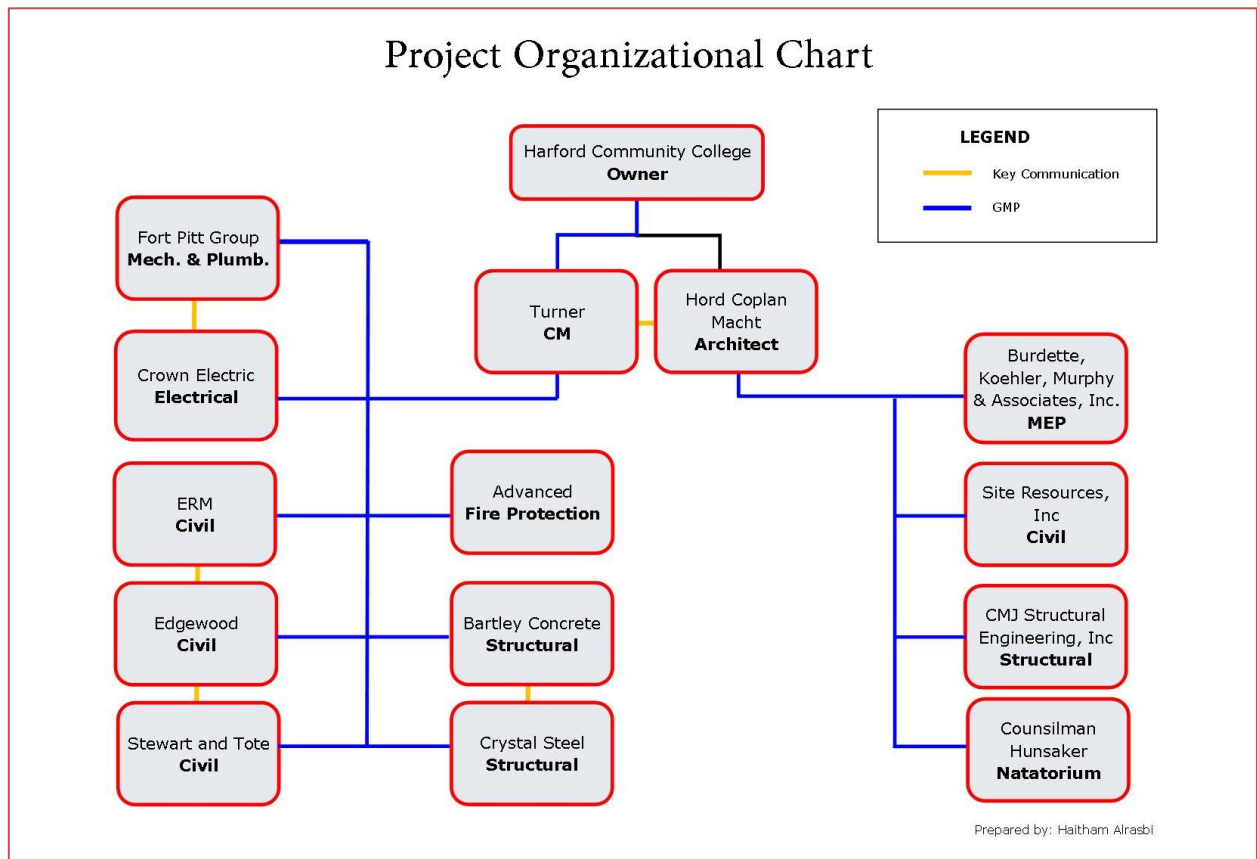


FIGURE 5: PROJECT ORGANIZATIONAL CHART

The owner, Harford Community College, and Turner have both agreed on a Guaranteed Maximum Price (GMP) contract in order to execute this project. Turner holds the subcontracts for the Civil, Structural, MEP, Fire protection contractors along with others. Figure 5 better describes the relationship between the key parties in this project. Hord Coplan Macht has MEP, Civil, Structural and Natatorium designers that work under their umbrella.

Staffing Plan

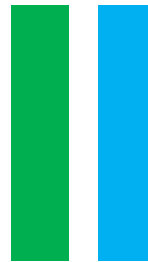
The staffing for Turner in this project is Doug Belling as a Project Manager, John Ricketts as Lead Superintendent, Brendan Kerin as Engineer. Just last spring Rick Sopala was added as a Renovation Superintendent to the project. This adds up to four employees working full-time at the site. Table 4 below shows the breakdown for Turner’s other employees that work back at Philadelphia’s main office along with the construction team at site. It also shows the time duration of work they spent on the project.

Staff	Duration	
Preconstruction		
Estimating/Purchasing		
Chief Estimator	5	months
Secretary	5	months
Sr. Estimator	5	months
Superintendent	5	months
Sr. Mechanical Estimator	3	months
Project Manager	5	months
Superintendent	5	months
Construction		
Management		
Operations Manager	16	months
Project Executive	16	months
Project Manager (D.Belling)	16	months
Estimating/Purchasing		
Purchasing Manager	3	months
Purchasing Agent	2	months
Purchasing Clerical	2	months
Superintendence		
Project Superintendent (J.Ricketts)	14	months
PM MEP / Commissioning	1	months
Asst Super /Engineer	14	months
Safety Director	14	months
Engineering		
Project Engineer (B.Kerin)	16	months
Financial		
Accountant	16	months
Cost Engineer	16	months
Other		
Administrative Assistant	14	months

TABLE 4: STAFFING PLAN

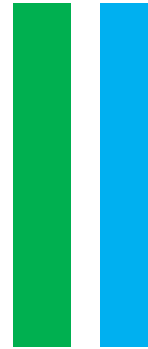
Appendix A

Project Schedule



Appendix B

Structural Drawing of
the Arena Addition



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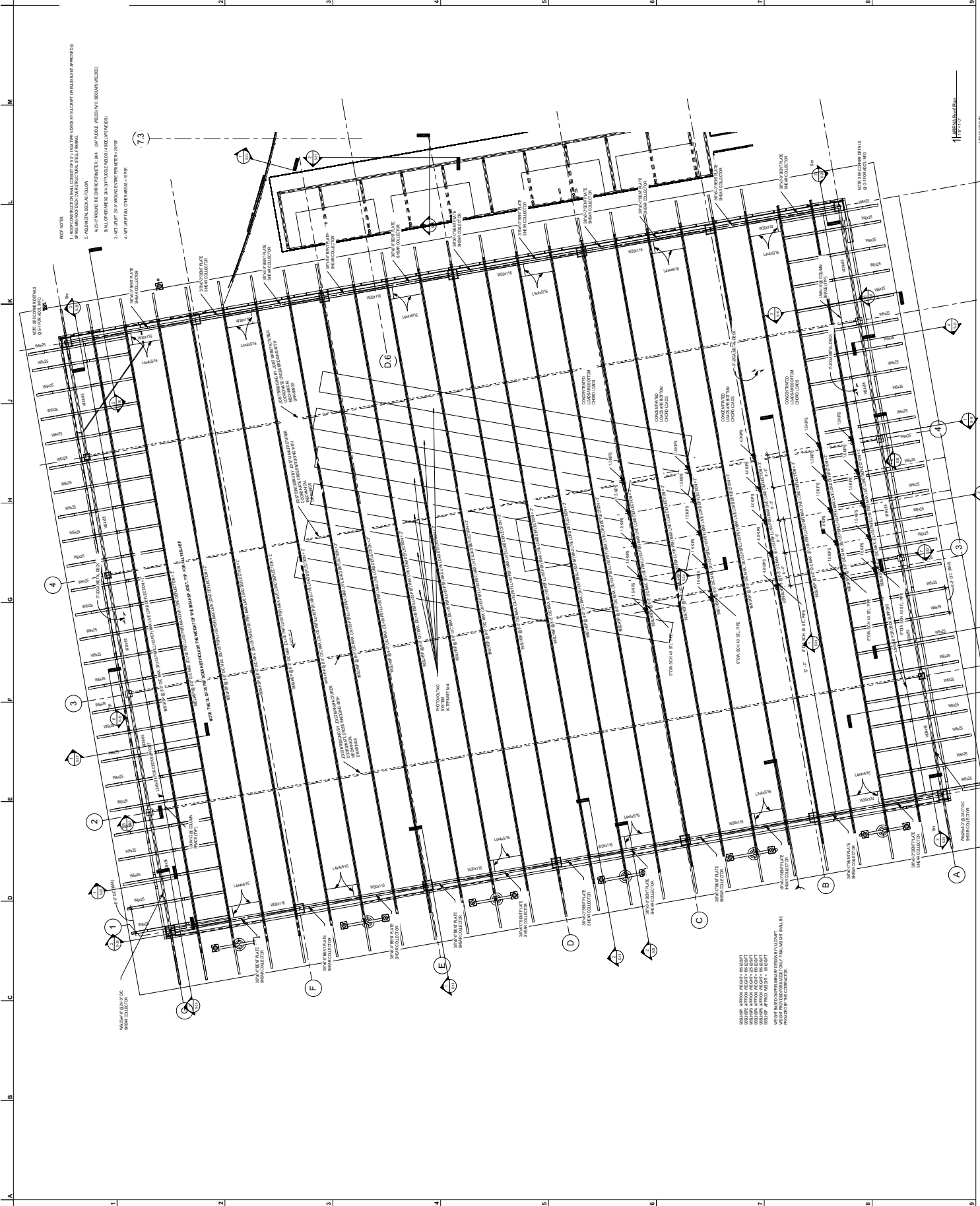
REVISIONS
 SHEET TITLE
 Roof Framing Plan - High
 Arena Roof

SCALE DATE PROJ
 1/8" = 1'-0" 02/2009 2009.01

PROJECT PHASE
 100 Percent Construction Documents

DRAWING #
S-9

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ROOF NOTES
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Appendix C

Square Foot Estimate



Square Foot Cost Estimate Report



Back




Print



Export

Estimate Name: Untitled	
Building Type:	Gymnasium with Face Brick with Concrete Block Back-up / Rigid Steel Frame
Location:	BALTIMORE, MD
Stories:	1
Story Height (L.F.):	37.5
Floor Area (S.F.):	57500
Labor Type:	Union
Basement Included:	No
Data Release:	Year 2010 Quarter 3
Cost Per Square Foot:	\$142.60
Building Cost:	\$8,199,500



Costs are derived from a building model with basic components. Scope differences and market conditions can cause costs to vary significantly.

		% of Total	Cost Per S.F.	Cost
A Substructure		6.4%	\$6.87	\$395,000
A1010 Standard Foundations			\$0.98	\$56,500
	Strip footing, concrete, reinforced, load 11.1 KLF, soil bearing capacity 6 KSF, 12" deep x 24" wide			
	spread footings, 3000 PSI concrete, load 50K, soil bearing capacity 3 KSF, 4' - 6" square x 12" deep			
	spread footings, 3000 PSI concrete, load 50K, soil bearing capacity 6 KSF, 3' - 0" square x 12" deep			
A1030 Slab on Grade			\$4.51	\$259,500
	Slab on grade, 4" thick, non industrial, reinforced			
A2010 Basement Excavation			\$0.16	\$9,000
	Excavate and fill, 30,000 SF, 4' deep, sand, gravel, or common earth, on site storage			
A2020 Basement Walls			\$1.22	\$70,000
	Foundation wall, CIP, 4' wall height, direct chute, .099 CY/LF, 4.8 PLF, 8" thick			
B Shell		38.4%	\$40.90	\$2,352,000
B1020 Roof Construction			\$16.33	\$939,000
	Steel frame for 1 story buildings, 60 - 100' span			
	Steel deck, 3" deep, 16 ga, single 20' span, 6.0 PSF, 40 PSF superimposed load			
B2010 Exterior Walls			\$16.68	\$959,000
	Brick wall, composite double wythe, standard face/CMU back-up, 8" thick, perlite core fill			
B2020 Exterior Windows			\$2.95	\$169,500
	Windows, aluminum, awning, standard glass, 3'-1" x 3'-2"			
B2030 Exterior Doors			\$0.53	\$30,500
	Door, aluminum & glass, sliding patio, tempered glass, economy, 6'-0" x 7'-0" opening			
	Door, wood, overhead, panels, heavy duty, manual operation, 10'-0" x 10'-0" opening			

	Door, steel 24 gauge, overhead, sectional, manual operation, 10'-0" x 10'-0" opening		
B3010	Roof Coverings	\$4.42	\$254,000
	Drip edge, aluminum .016" thick, 5" girth, mill finish		
	Roofing, single ply membrane, EPDM, 60 mils, fully adhered		
	Insulation, rigid, roof deck, polyisocyanurate, 2#/CF, 3.5" thick		
C Interiors		18.5%	\$19.72 \$1,134,000
C1010	Partitions	\$1.48	\$85,000
	Concrete block (CMU) partition, light weight, hollow, 6" thick, no finish		
C1020	Interior Doors	\$1.87	\$107,500
	Door, single leaf, kd steel frame, hollow metal, commercial quality, flush, 3'-0" x 7'-0" x 1-3/8"		
C1030	Fittings	\$0.12	\$7,000
	Toilet partitions, cubicles, ceiling hung, stainless steel		
C3010	Wall Finishes	\$2.83	\$163,000
	2 coats paint on masonry with block filler		
	Painting, masonry or concrete, latex, brushwork, primer & 2 coats		
	Ceramic tile, thin set, 4-1/4" x 4-1/4"		
C3020	Floor Finishes	\$12.57	\$722,500
	Tile, ceramic natural clay		
	Maple strip, sanded and finished, maximum		
	Add for sleepers on concrete, treated, 24" OC, 1"x2"		
C3030	Ceiling Finishes	\$0.85	\$49,000
	Acoustic ceilings, 3/4" mineral fiber, 12" x 12" tile, concealed 2" bar & channel grid, suspended support		
D Services		29.3%	\$31.23 \$1,796,000
D2010	Plumbing Fixtures	\$6.01	\$345,500
	Water closet, vitreous china, bowl only with flush valve, wall hung		
	Urinal, vitreous china, wall hung		
	Lavatory w/trim, wall hung, PE on CI, 19" x 17"		
	Service sink w/trim, PE on CI, wall hung w/rim guard, 24" x 20"		
	Shower, stall, baked enamel, terrazzo receptor, 36" square		
	Water cooler, electric, wall hung, dual height, 14.3 GPH		
D2020	Domestic Water Distribution	\$1.74	\$100,000
	Electric water heater, commercial, 100< F rise, 500 gal, 240 KW 984 GPH		
D3050	Terminal & Package Units	\$9.70	\$558,000
	Rooftop, single zone, air conditioner, banks or libraries, 10,000 SF, 41.67 ton		
D4010	Sprinklers	\$2.97	\$171,000
	Wet pipe sprinkler systems, steel, light hazard, 1 floor, 10,000 SF		
D5010	Electrical Service/Distribution	\$0.34	\$19,500
	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 400 A		
	Feeder installation 600 V, including RGS conduit and XHHW wire, 400 A		
	Switchgear installation, incl switchboard, panels & circuit breaker, 400 A		
D5020	Lighting and Branch Wiring	\$8.43	\$485,000
	Receptacles incl plate, box, conduit, wire, 8 per 1000 SF, .9 watts per SF		
	Wall switches, 1.0 per 1000 SF		
	Miscellaneous power, 1 watt		

	Central air conditioning power, 4 watts			
	Fluorescent fixtures recess mounted in ceiling, 2 watt per SF, 40 FC, 10 fixtures @40 watt per 1000 SF			
D5030	Communications and Security		\$1.83	\$105,500
	Communication and alarm systems, includes outlets, boxes, conduit and wire, sound systems, 12 outlets			
	Communication and alarm systems, fire detection, non-addressable, 25 detectors, includes outlets, boxes, conduit and wire			
D5090	Other Electrical Systems		\$0.20	\$11,500
	Generator sets, w/battery, charger, muffler and transfer switch, gas/gasoline operated, 3 phase, 4 wire, 277/480 V, 7.5 kW			
E Equipment & Furnishings		7.4%	\$7.89	\$453,500
E1090	Other Equipment		\$7.89	\$453,500
	10 - Emergency lighting units, nickel cadmium battery operated, twin sealed beam light, 25 W, 6 V each			
	8 - Emergency lighting units, lead battery operated, twin sealed beam light, 25 W, 6 V each			
	7 - Sound system, trumpet			
	10 - Sound system, speaker, ceiling or wall			
	7 - Sound system, amplifier, 250 W			
	50 - Lockers, steel, baked enamel, single tier, maximum			
	3 - Basketball backstops, school equipment, wall mounted, swing-up, 6' extended, maximum			
	3 - Basketball backstops, school equipment, wall mounted, fixed, 6' extended, maximum			
	1 - School equipment, scoreboards, basketball, one side, maximum			
	2 - School equipment, scoreboards, basketball, one side, minimum			
	5 - Gym divider curtain, school equipment, mesh top, vinyl bottom, manual			
	30 - Bleachers, telescoping, school equipment, manual, 21 to 30 tier, maximum			
	Architectural equipment, school equipment bleachers-telescoping, manual operation, 15 tier, economy (per seat)			
	Architectural equipment, school equipment, weight lifting gym, universal, deluxe			
	Architectural equipment, sauna, prefabricated, including heater and controls, 7' high, 6' x 4'			
F Special Construction		0.0%	\$0.00	\$0
G Building Sitework		0.0%	\$0.00	\$0

SubTotal	100%	\$106.62	\$6,130,500
Contractor Fees (GC,Overhead,Profit)	25.0%	\$26.65	\$1,532,500
Architectural Fees	7.0%	\$9.33	\$536,500
User Fees	0.0%	\$0.00	\$0
Total Building Cost		\$142.60	\$8,199,500



Square Foot Cost Estimate Report



Back



Print



Export

Estimate Name: **Susquehanna Sports Center - Renovation**

Building Type: College, Student Union with Brick Face with Concrete Block Back-up / Steel Frame

Location: **BALTIMORE, MD**
 Stories: **2**
 Story Height (L.F.): **16**
 Floor Area (S.F.): **48315**
 Labor Type: **Union**
 Basement Included: **Yes**
 Data Release: **Year 2010 Quarter 3**
 Cost Per Square Foot: **\$171.23**
 Building Cost: **\$8,273,000**



Costs are derived from a building model with basic components. Scope differences and market conditions can cause costs to vary significantly.

		% of Total	Cost Per S.F.	Cost
A Substructure		7.0%	\$8.99	\$434,500
A1010 Standard Foundations			\$2.34	\$113,000
	Strip footing, concrete, reinforced, load 11.1 KLF, soil bearing capacity 6 KSF, 12" deep x 24" wide			
	Spread footings, 3000 PSI concrete, load 200K, soil bearing capacity 6 KSF, 6' - 0" square x 20" deep			
A1030 Slab on Grade			\$2.26	\$109,000
	Slab on grade, 4" thick, non industrial, reinforced			
A2010 Basement Excavation			\$1.51	\$73,000
	Excavate and fill, 10,000 SF, 8' deep, sand, gravel, or common earth, on site storage			
A2020 Basement Walls			\$2.89	\$139,500
	Foundation wall, CIP, 12' wall height, pumped, .444 CY/LF, 21.59 PLF, 12" thick			
B Shell		36.8%	\$47.09	\$2,275,000
B1010 Floor Construction			\$23.46	\$1,133,500
	Cast-in-place concrete column, 12" square, tied, 200K load, 12' story height, 142 lbs/LF, 4000PSI			
	Steel column, W12, 400 KIPS, 10' unsupported height, 79 PLF			
	Flat slab, concrete, with drop panels, 6" slab/2.5" panel, 12" column, 15'x15' bay, 75 PSF superimposed load, 153 PSF total load			
	Floor, composite concrete slab on fireproofed W beam, 5.5" slab, 25'x25' bay, 24.5" total depth, 125 PSF superimposed load, 200 PSF total			
B1020 Roof Construction			\$9.26	\$447,500
	Floor, composite slab on steel beam, 25'x25' bay, 4.5" slab, 20.5" total depth, 40 PSF superimposed load, 99 PSF total load			
B2010 Exterior Walls			\$8.10	\$391,500
	Brick wall, composite double wythe, standard face/CMU back-up, 8" thick, perlite core fill			

B2020	Exterior Windows		\$3.45	\$166,500
	Aluminum flush tube frame, for 1/4"glass,1-3/4"x4", 5'x6' opening, no intermediate horizontals			
	Glazing panel, plate glass, 1/4" thick, clear			
B2030	Exterior Doors		\$0.35	\$17,000
	Door, aluminum & glass, without transom, bronze finish, hardware, 3'-0" x 7'-0" opening			
B3010	Roof Coverings		\$2.44	\$118,000
	Roofing, asphalt flood coat, gravel, base sheet, 3 plies 15# asphalt felt, mopped			
	Insulation, rigid, roof deck, composite with 2" EPS, 1" perlite			
	Roof edges, aluminum, duranodic, .050" thick, 6" face			
	Flashing, aluminum, no backing sides, .019"			
	Gravel stop, aluminum, extruded, 4", mill finish, .050" thick			
B3020	Roof Openings		\$0.02	\$1,000
	Skylight, plastic domes, insulated curbs, 30 SF to 65 SF, single glazing			
C Interiors		18.6%	\$23.78	\$1,149,000
C1010	Partitions		\$3.36	\$162,500
	Metal partition, 5/8"fire rated gypsum board face, 1/4" sound deadening gypsum board, 2-1/2" @ 24", same opposite face, no insulation			
C1020	Interior Doors		\$6.67	\$322,500
	Door, single leaf, kd steel frame, hollow metal, commercial quality, flush, 3'-0" x 7'-0" x 1-3/8"			
C2010	Stair Construction		\$1.01	\$49,000
	Stairs, CIP concrete, w/landing, 20 risers, with nosing			
C3010	Wall Finishes		\$2.62	\$126,500
	2 coats paint on masonry with block filler			
	Painting, interior on plaster and drywall, walls & ceilings, roller work, primer & 2 coats			
	Vinyl wall covering, fabric back, medium weight			
C3020	Floor Finishes		\$6.20	\$299,500
	Carpet, tufted, nylon, roll goods, 12' wide, 36 oz			
	Carpet, padding, add to above, maximum			
	Vinyl, composition tile, maximum			
C3030	Ceiling Finishes		\$3.91	\$189,000
	Acoustic ceilings, 3/4" fiberglass board, 24" x 48" tile, tee grid, suspended support			
D Services		37.4%	\$47.85	\$2,312,000
D1010	Elevators and Lifts		\$7.70	\$372,000
	3 - Hydraulic, passenger elevator, 3500 lb, 2 floors, 100 FPM			
	Hydraulic passenger elevator, 2500 lb., 2 floor, 125 FPM			
D2010	Plumbing Fixtures		\$2.41	\$116,500
	Water closet, vitreous china, tank type, 2 piece close coupled			
	Urinal, vitreous china, wall hung			
	Lavatory w/trim, vanity top, PE on CI, 19" x 16" oval			
	Kitchen sink w/trim, countertop, stainless steel, 19" x 18" single bowl			
	Service sink w/trim, PE on CI, corner floor, 28" x 28", w/rim guard			
	Shower, stall, baked enamel, molded stone receptor, 32" square			
	Water cooler, electric, floor mounted, dual height, 14.3 GPH			
D2020	Domestic Water Distribution		\$0.39	\$19,000

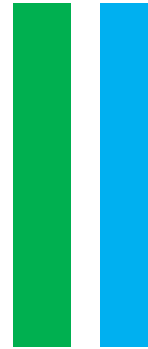
	Gas fired water heater, commercial, 100< F rise, 200 MBH input, 192 GPH			
D2040	Rain Water Drainage		\$0.24	\$11,500
	Roof drain, CI, soil,single hub, 5" diam, 10' high			
	Roof drain, CI, soil,single hub, 5" diam, for each additional foot add			
D3050	Terminal & Package Units		\$17.49	\$845,000
	Rooftop, multizone, air conditioner, schools and colleges, 25,000 SF, 95.83 ton			
D4010	Sprinklers		\$2.67	\$129,000
	Wet pipe sprinkler systems, steel, light hazard, 1 floor, 10,000 SF			
	Wet pipe sprinkler systems, steel, light hazard, each additional floor, 10,000 SF			
D4020	Standpipes		\$0.68	\$33,000
	Wet standpipe risers, class III, steel, black, sch 40, 6" diam pipe, 1 floor			
	Wet standpipe risers, class III, steel, black, sch 40, 6" diam pipe, additional floors			
D5010	Electrical Service/Distribution		\$1.12	\$54,000
	Service installation, includes breakers, metering, 20' conduit & wire, 3 phase, 4 wire, 120/208 V, 600 A			
	Feeder installation 600 V, including RGS conduit and XHHW wire, 600 A			
	Switchgear installation, incl switchboard, panels & circuit breaker, 600 A			
D5020	Lighting and Branch Wiring		\$11.68	\$564,500
	Receptacles incl plate, box, conduit, wire, 8 per 1000 SF, .9 W per SF, with transformer			
	Wall switches, 2.0 per 1000 SF			
	Miscellaneous power, 1.2 watts			
	Central air conditioning power, 4 watts			
	Motor installation, three phase, 460 V, 15 HP motor size			
	Motor feeder systems, three phase, feed to 200 V 5 HP, 230 V 7.5 HP, 460 V 15 HP, 575 V 20 HP			
	Fluorescent fixtures recess mounted in ceiling, 2.4 watt per SF, 60 FC, 15 fixtures @ 32 watt per 1000 SF			
D5030	Communications and Security		\$3.32	\$160,500
	Communication and alarm systems, includes outlets, boxes, conduit and wire, sound systems, 12 outlets			
	Fire alarm command center, addressable without voice, excl. wire & conduit			
	Communication and alarm systems, includes outlets, boxes, conduit and wire, intercom systems, 25 stations			
	Communication and alarm systems, includes outlets, boxes, conduit and wire, master TV antenna systems, 12 outlets			
	Internet wiring, 8 data/voice outlets per 1000 S.F.			
D5090	Other Electrical Systems		\$0.14	\$7,000
	Generator sets, w/battery, charger, muffler and transfer switch, gas/gasoline operated, 3 phase, 4 wire, 277/480 V, 11.5 kW			
E Equipment & Furnishings		0.2%	\$0.31	\$15,000
E1090	Other Equipment		\$0.31	\$15,000
	3 - Sound system, trumpet			
	10 - Sound system, speaker, ceiling or wall			
	2 - Sound system, amplifier, 250 W			
	20 - Lockers, steel, baked enamel, single tier, maximum			
F Special Construction		0.0%	\$0.00	\$0
G Building Sitework		0.0%	\$0.00	\$0

SubTotal		100%	\$128.02	\$6,185,500
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Contractor Fees (GC,Overhead,Profit)	25.0%	\$32.01	\$1,546,500
Architectural Fees	7.0%	\$11.20	\$541,000
User Fees	0.0%	\$0.00	\$0
Total Building Cost		\$171.23	\$8,273,000

Appendix D

Mechanical Assemblies Estimate



Harford Community College,



Bel Air,
MD , 21015
Year 2010 Quarter 3

Unit Detail Report

Prepared By:
Haitham Alrasbi
aasda




Date: 20-Sep-12

Mechanical Assemblies

Line Number	Description	Quantity	Unit	Total Incl. O&P	Ext. Total Incl. O&P
Division 22 Plumbing					
220716102920	Insulation, domestic water heater wrap kit, with vinyl jacket, 1-1/2" thick, 20-60 gal.	12	Ea.	\$95.65	\$1,147.80
221423337300	Drain, backwater valve, soil pipe, cast iron body, bronze flapper valve, bolted cover, 4" pipe size	7	Ea.	\$1,081.50	\$7,570.50
221429131200	Pump, pedestal sump, solid brass, 21 GPM, 1/3 H.P., at 15' head, includes float control	10	Ea.	\$415.00	\$4,150.00
223530101080	Heat transfer package, complete, hot water, 180Deg. F enter, 200Deg. F leaving, 15 psi steam, one pump system, 255 GPM, includes controls, expansion tank, converter, air separator	2	Ea.	\$41,550.00	\$83,100.00
223530101120	Heat transfer package, complete, hot water, 180Deg. F enter, 200Deg. F leaving, 15 psi steam, one pump system, 800 GPM, includes controls, expansion tank, converter, air separator	2	Ea.	\$62,975.00	\$125,950.00
225119501040	Swimming Pool Equip., filter system, 5,000 SF pool, add for chlorination system	2	Ea.	\$2,665.00	\$5,330.00
Division 22 Plumbing Subtotal					\$227,248.30
Division 23 Heating, Ventilating, and Air-Conditioning (HVAC)					
230593200700	Balancing, water, fin tube and radiant panels, (Subcontractor's quote including material & labor)	2	Ea.	\$124.00	\$248.00
230713103430	Insulation, ductwork, blanket type, fiberglass, flexible, FSK facing, 1 lb. density, 2" thick	7781	S.F.	\$3.62	\$28,167.22
230923101030	Control Components/DDC Systems, subcontractor's quote incl. material & labor, analog outputs, (avg. 50' run in 1/2" EMT), pneumatic, excl. control device	23	Ea.	\$613.83	\$14,118.09
232120462380	Expansion tanks, steel, liquid expansion, galvanized, 24 gallon capacity, ASME	1	Ea.	\$1,205.00	\$1,205.00

232120462390		Expansion tanks, steel, liquid expansion, galvanized, 30 gallon capacity, ASME	1	Ea.	\$1,293.50	\$1,293.50
232123132300		Pump, circulating, cast iron, heated or chilled water application, in line, flanged joints, 1/2 H.P., 3" size	3	Ea.	\$1,581.00	\$4,743.00
232123132340		Pump, circulating, cast iron, heated or chilled water application, in line, flanged joints, 3/4 H.P., 3" size	5	Ea.	\$1,781.00	\$8,905.00
233113130150		Metal Ductwork, fabricated rectangular, 2000 to 5000 lb., aluminum alloy 3003-H14, includes fittings, joints, supports and allowance for a flexible connection, excludes insulation	4400	Lb.	\$15.17	\$66,748.00
233313136020		Duct accessories, multi-blade dampers, opposed blade, 12" x 18"	35	Ea.	\$73.50	\$2,572.50
233313163040		Duct accessories, fire damper, curtain type, vertical, 12" x 6", U.L. label, 1-1/2 hour rated	35	Ea.	\$51.00	\$1,785.00
233313328330		Duct accessories, relief damper, electronic bypass with tight seal, 16" x 10"	35	Ea.	\$237.50	\$8,312.50
233319109013		Duct accessories, duct sound trap, packaged, 9000 CFM, 24" x 30" x 36"	10	Ea.	\$891.50	\$8,915.00
233416103560		Fans, centrifugal, airfoil, motor and drive complete, 4000 CFM, 3 H.P.	7	Ea.	\$3,280.00	\$22,960.00
233613105200		Duct accessories, mixing box, constant volume, 150 to 270 CFM, includes electric or pneumatic motor	114	Ea.	\$784.00	\$89,376.00
235228100240		Swimming pool heater, gas fired, input, 300MBH, excludes wiring, piping, base or pad	6	Ea.	\$5,025.00	\$30,150.00
235288104825		Burner, burner oil pump, for 10,000 MBH boiler	4	Ea.	\$112.00	\$448.00
235716100200		Heat Exchanger, shell & tube type, cast iron heads, cast iron tube sheet, steel shell, 2 or 4 pass, hot water 40Deg.F to 180Deg.F, by steam at 10 PSI, 96 GPM, 3/4" copper tubes	2	Ea.	\$10,275.00	\$20,550.00
236333103720		Condenser, ratings are for evaporative, copper coil, pump, fan motor, 30Deg.F T.D., 150 ton, R-22	10	Ea.	\$34,975.00	\$349,750.00

236423100515		Packaged water chillers, scroll, liquid chiller, packaged unit with integral air cooled condenser, 30 ton cooling, includes standard controls	3	Ea.	\$36,450.00	\$109,350.00
237213104030		Heat recovery package, air to air, enthalpy recovery wheel, 4000 max CFM	5	Ea.	\$10,375.00	\$51,875.00
237313100926		Air handling unit, built-up, horizontal/vertical, constant volume, single zone, 6500 CFM, with cooling/heating coil section, filters, mixing box	16	Ea.	\$13,350.00	\$213,600.00
238126100130		Split ductless system, cooling only, single zone, wall mount, 1 ton cooling	12	Ea.	\$1,420.00	\$17,040.00
238219100150		Fan coil A.C., cabinet mounted, chilled water, 2 ton cooling, includes filters and controls	4	Ea.	\$1,488.00	\$5,952.00
238219100970		Fan coil A.C., direct expansion for use w/air cooled condensing unit, 3 ton cooling, includes filters and controls	4	Ea.	\$1,370.00	\$5,480.00
Division 23 Heating, Ventilating, and Air-Conditioning (HVAC) Subtotal						\$1,063,543.81

To view the Printer Friendly Version you'll need Adobe Acrobat Reader installed on your computer. To download click on the link below.



Harford Community College,



Bel Air,
MD , 21015
Year 2010 Quarter 3

Unit Summary Report

Prepared By:

Haitham Alrasbi

aasda

Date: 20-Sep-12

Mechanical Assemblies

Division Description	Total	
Division 22 Plumbing		\$227,248.30
Division 23 Heating, Ventilating, and Air-Conditioning (HVAC)		\$1,063,543.81
SubTotal		\$1,290,792.11
General Contractor's Markup on Subs	3.00%	\$0.00
SubTotal		\$1,290,792.11
General Conditions	3.00%	\$38,723.76
SubTotal		\$1,329,515.87
General Contractor's Overhead and Profit	3.00%	\$39,885.48
Grand Total		\$1,369,401.35

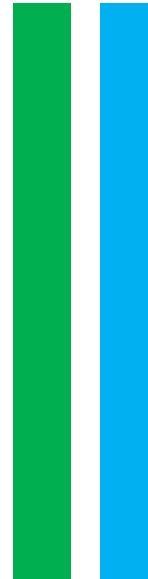


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Appendix E














Existing Conditions
Site Plan
And
Turner's Site
Logistics Plan

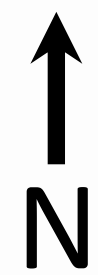


Susquehanna Sports Center
Renovation & Addition
EXISTING CONDITIONS PLAN
 Haitham Alrasbi
 09/21/12

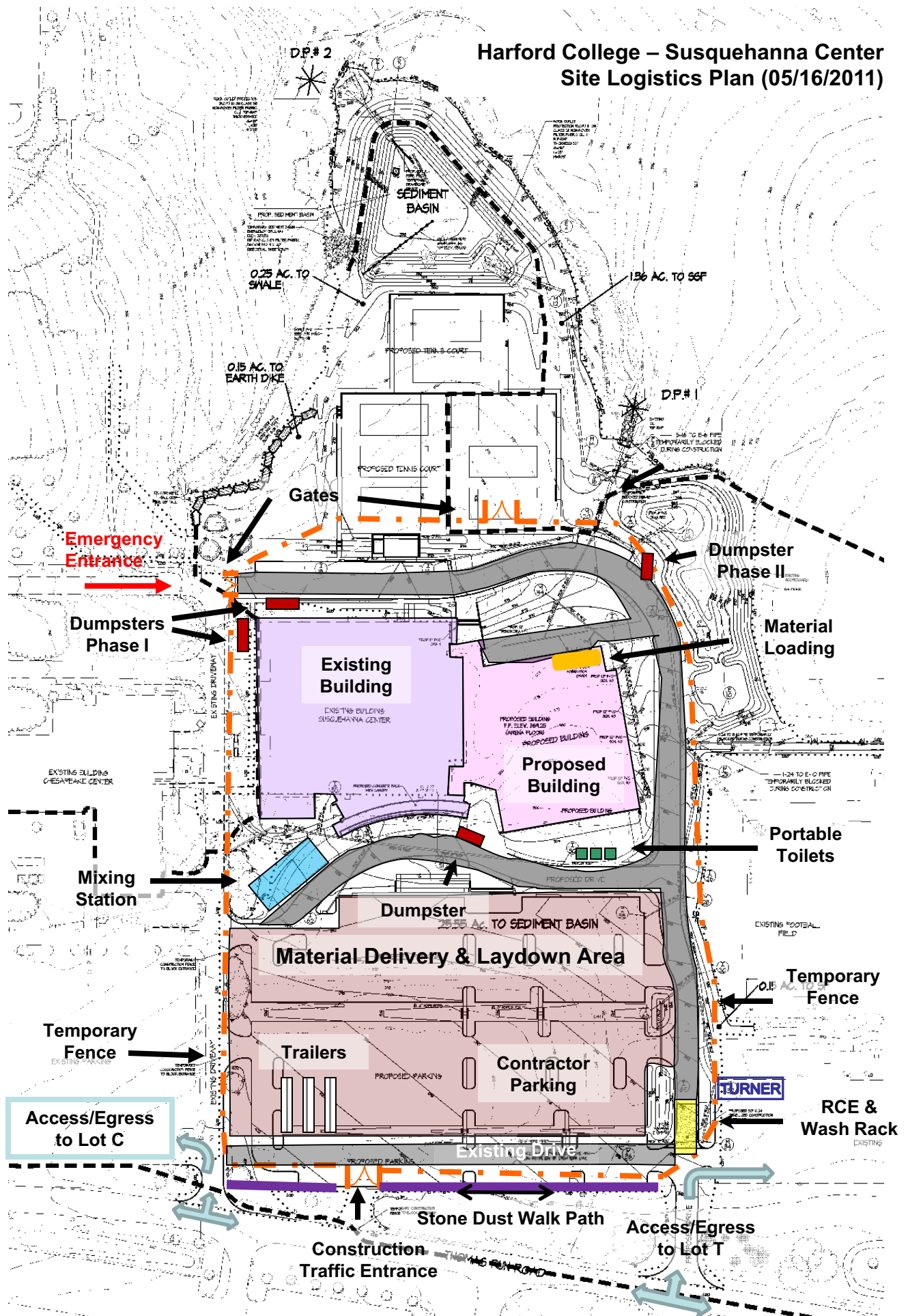


LEGEND

	Dumpster
	Portable Toilets
	Trailers
	RCE & Wash rack
	Mixing Station
	Gate
	Vehicular Traffic
	Construction Traffic
	Pedestrian Walkway
	Pedestrian Traffic
	Water Line
	Sanitary Line
	Electrical Line

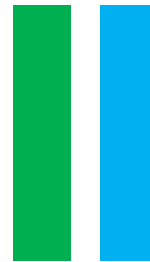


Harford College – Susquehanna Center Site Logistics Plan (05/16/2011)



Appendix F

Phased Site Layouts



**Susquehanna Sports Center
Renovation & Addition
SITE LAYOUT— PHASE I
(EXCAVATION & DEMOLITION)**

Haitham Alrasbi

09/21/12



LEGEND

-  Dumpster
-  Portable Toilets
-  Trailers
-  RCE & Wash rack
-  Mixing Station
-  Gate
-  Pedestrian Walkway
-  Equipment
-  Ramp



Susquehanna Sports Center

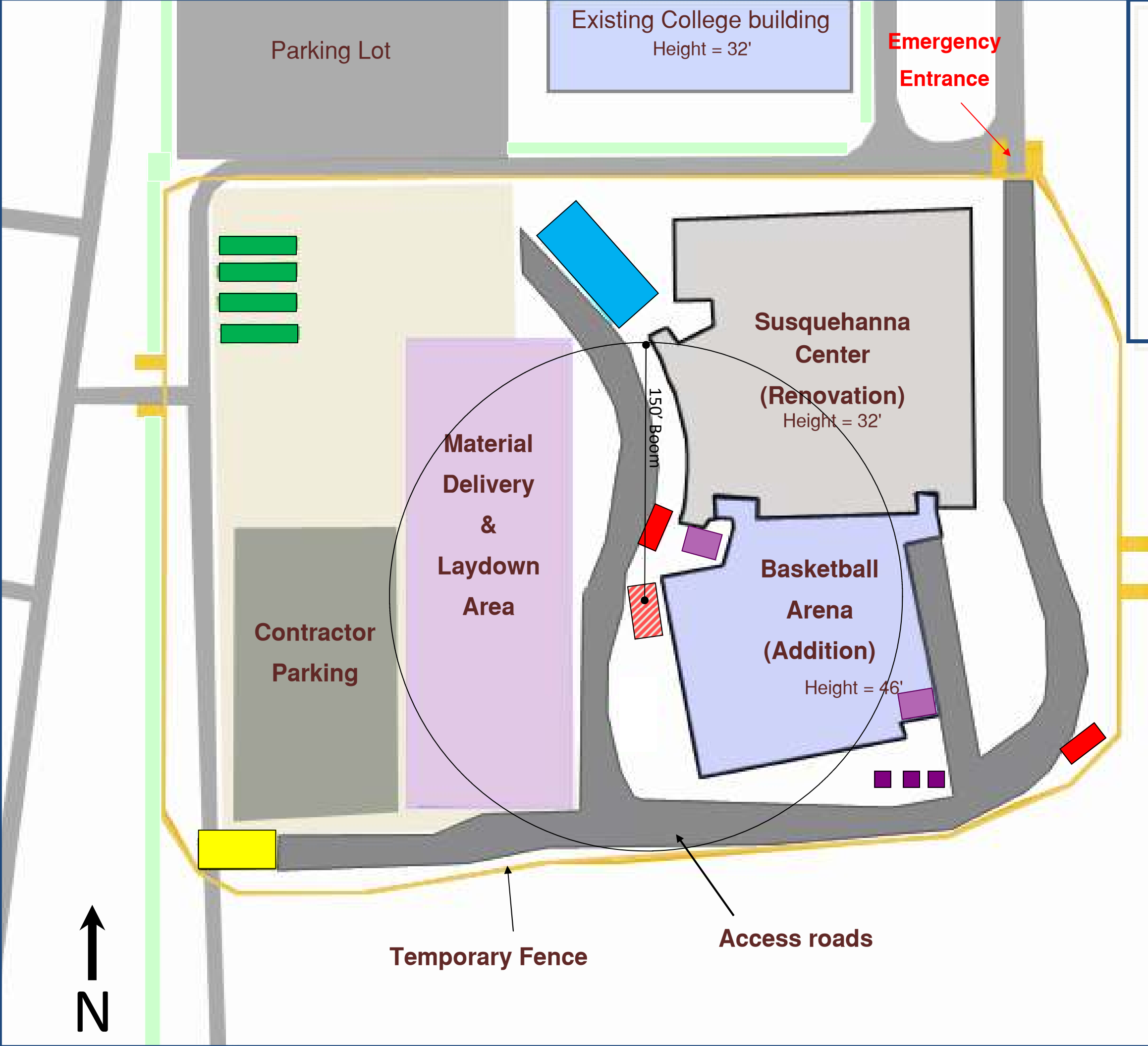
Renovation & Addition

SITE LAYOUT— PHASE II





(SUPERSTRUCTURE)

Haitham Alrasbi

09/21/12



LEGEND

-  Dumpster
-  Portable Toilets
-  Trailers
-  RCE & Wash rack
-  Mixing Station
-  Gate
-  Pedestrian Walkway
-  150' Krupp Crane
-  Material Hoist









**Susquehanna Sports Center
Renovation & Addition
SITE LAYOUT— PHASE III**

(FINISHES)

Haitham Alrasbi

09/21/12

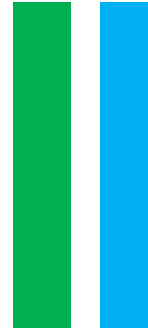
LEGEND

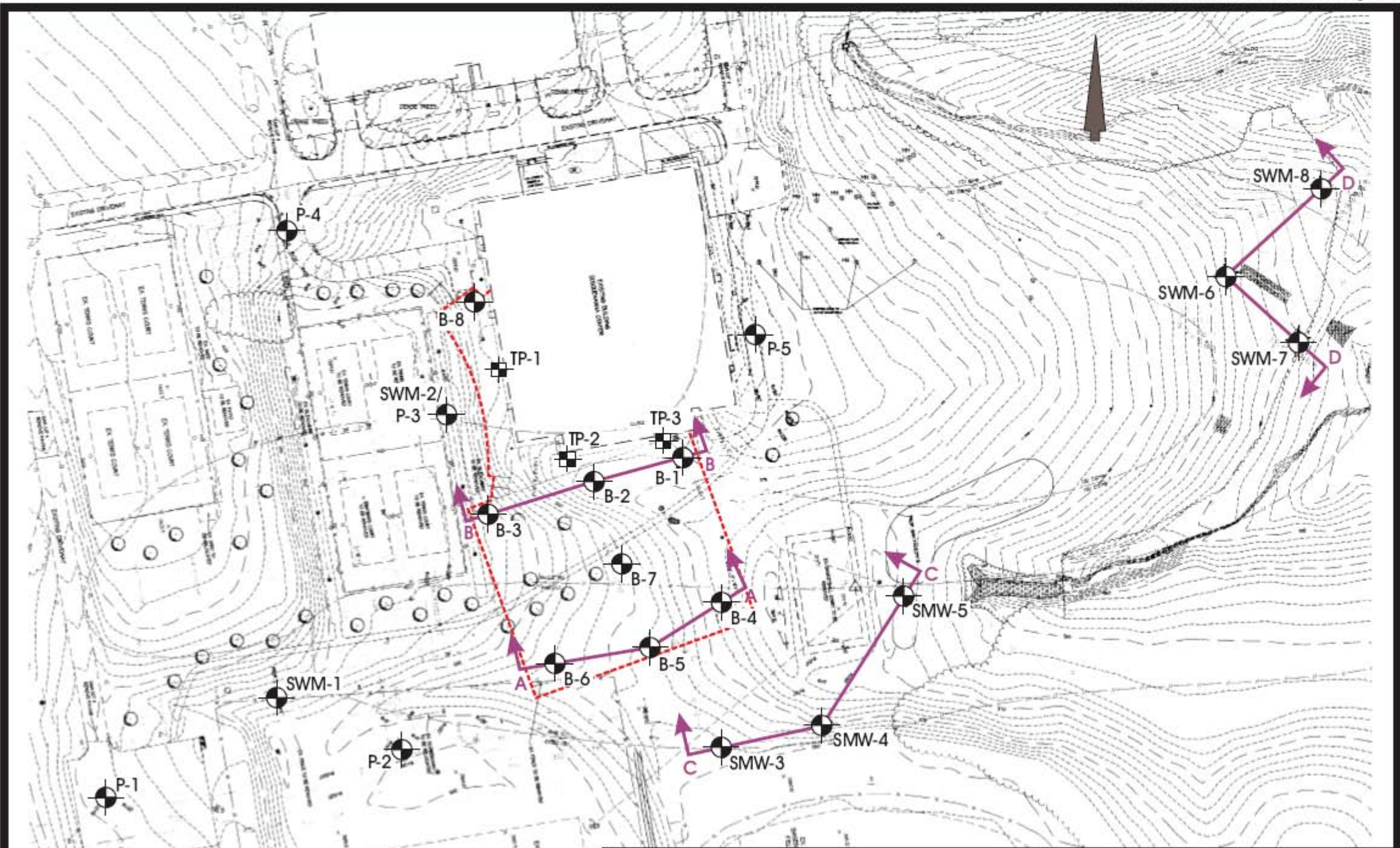
-  Dumpster
-  Portable Toilets
-  Trailers
-  RCE & Wash rack
-  Mixing Station
-  Gate
-  Pedestrian Walkway
-  Material Hoist



Appendix G

Boring and Test Pit Location Plan





SUSQUEHANNA CENTER ADDITIONS
 HARFORD COMMUNITY COLLEGE
 HARFORD COUNTY, MARYLAND

BORING/TEST PIT LOCATION PLAN

PLATE

HORIZ SCALE 0 80 (FEET)

09013MD
 MAY, 2009

1